

REMARKS/ARGUMENTS

Claims 1-28 are pending in the present application.

This Amendment is in response to the non-final Office Action mailed August 18, 2010. In the non-final Office Action, the Examiner objected to claims 3-7, rejected claims 3-7, 10-14, 17-21, and 24-28 under 35 U.S.C. § 112, second paragraph; claims 8-14, and 22-28 under 35 U.S.C. § 101; claims 1-28 under 35 U.S.C. § 103(a). Applicant has amended claims 1, 3, 5, 6, 8, 10, 12, 15, 17, 19, 22, 24, and 26. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Claim Objections

The Examiner objects to claims 3-7 due to minor informalities. Applicant has amended claims 3, 5, 6, 10, 12, 17, 19, 24, and 26 as suggested by the Examiner. Applicant respectfully requests that the Examiner withdraw the objection to claims 3-7

Rejection Under 35 U.S.C. § 112

In the Office Action, the Examiner rejected claims 3-7, 10-14, 17-21, and 24-28 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, the Examiner states that the limitation “the starting block” has insufficient antecedent basis in claims 3, 10, 17, and 24. Applicant has amended claims 3, 10, 17, and 24 to clarify the claim language.

Therefore, Applicant respectfully requests the rejection under 35 U.S.C. § 112 be withdrawn.

Rejection Under 35 U.S.C. § 101

In the Office Action, the Examiner rejected claims 8-14, and 22-28 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

1. Claims 8-14:

The Examiner contends that “[s]uch components are only software modules and thus can be interpreted as software program listing per se.” (Office Action, page 6, paragraph 12). Applicant respectfully disagrees for the following reasons.

First, the program transformer is described in paragraphs [0066] – [0069] in connection with Figure 9. The description specifically states that “[t]he program transformer 135 may be implemented by software, hardware, firmware, or any combination of these elements.” Accordingly, the Examiner’s statement that “[s]uch components are only software modules” is improper because it is clear that the program transformer 135 may be implemented by software, hardware, firmware, or any combination of these elements. The use of the alternative “or” indicates that the program transformer 135 may be implemented by software, OR by hardware, OR by firmware, or any combination of these elements (emphasis added.) Accordingly, it is not limited to only software implementation.

Second, even if the program transformer 135 is implemented by software, it does not mean that it can be interpreted as software program listing per se as alleged by the Examiner. As described in the specification, the program transformer 135 may be executed by the processor to compile, translate, or transform the program code. See, for example, Specification, paragraph [0031], [0066] – [0069], and Figure 9. Accordingly, it is not a program *listing* per se. A program listing is exactly what it is called, a listing of a program. In other words, it is a source code of the program. A listing is merely a piece of paper, or embodied in non-functional medium. In contrast, the program transformer as described in the specification and as claimed is capable of performing operations. For example, claim 8 recites “associate blocks of instructions . . .” and “sink the wait instruction down the block globally . . .” Certainly, a mere listing of a program cannot associate blocks of instructions or sink the wait instruction. It is therefore not a non-functional program listing.

2. Claims 22-28:

Applicant has amended claim 22 to recite “non-transitory storage medium.”

Accordingly, Applicant respectfully requests the rejections under 35 U.S.C. §101 be withdrawn.

Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1-28 under 35 U.S.C. §103(a) as being unpatentable over Chang (Chang et al., IMPACT: An architectural Framework for Multiple-Instruction-Issue Processors”) (“Chang”) in view of U.S. Publication No. 2005/0149916 A1

issued to Shpeisman et al. ("Shpeisman") and further in view of Midkiff (Midkiff et al., Compiler Algorithms for Synchronization) ("Midkiff"). Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *MPEP* §2143, p. 2100-126 to 2100-130 (8th Ed., Rev. 5, August 2006). Applicant respectfully submits that there is no suggestion or motivation to combine their teachings, and thus no *prima facie* case of obviousness has been established.

Furthermore, the Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated: "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." *MPEP* 2141. In *KSR International Co. vs. Teleflex, Inc.*, 127 S.Ct. 1727 (2007) (Kennedy, J.), the Court explained that "[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." The Court further required that an explicit analysis for this reason must be made. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR* 127 S.Ct. at 1741, quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). In the instant case, Applicant respectfully submits that there are significant differences between the cited references and the claimed invention and there is no apparent reason to combine the known elements in the manner as claimed, and thus no *prima facie* case of obviousness has been established.

1. Claims 1-28:

Chang discloses an architectural framework for multiple-instruction issue processors. Prepass code scheduling is performed prior to register allocation while postpass code scheduling is performed after register allocation (Chang, page 268, section 2.4 “Code Scheduling Algorithm”). Both prepass and postpass code scheduling algorithms consist of the following steps: 1) form traces from basic blocks that are likely to be executed as a sequence; 2) form a large superblock from each trace of basic blocks by code duplication. A superblock has a unique entry point, and one or more exit points (Chang, page 268, section 2.4 “Code Scheduling Algorithm”). The code scheduler moves code both upward and downward across branch operations within a superblock (Chang, page 268, section 2.5 “Code Scheduling Models”, first paragraph). For downward code motion, e.g., X precedes Y, if Y does not depend on X then X can be moved below Y (Chang, page 268, section 2.5 “Code Scheduling Models”, second paragraph).

Shpeisman discloses data layout mechanism to reduce hardware resource conflicts. compiler 202 may create a data layout 800 by mapping data elements 352, 354, 356, 358 referenced by the machine-executable instructions 328, 330, 332, 334, 336, 338 to memory locations 214 in accordance with a colored conflict graph 700 (Shpeisman, paragraph [0034], lines 1-7). Each color C1, C2, C3 may correspond to a hardware resource (Shpeisman, paragraph [0058], lines 1-3). The assignment of a color to a node may represent the assignment of a hardware resource to the data represented by the node (Shpeisman, paragraph [0058], lines 5-8).

Midkiff discloses compiler algorithms for synchronization. Two instruction sets are used to synchronize between groups of statement (Midkiff, page 1487, left column, Section IV.C “Two synchronization Instruction Sets”). The set instruction is used to signal that some event has occurred, and the wait instruction is used to wait until that event occurs (Midkiff, page 1487, right column, Section IV.C “Two synchronization Instruction Sets”). When synchronizing dependencies with wait and set, a set statement is placed after the source of the dependence to signal that the source has executed, and a wait is placed before the sink to ensure that the source executes first (Midkiff, page 1488, right column, Section V.B “Generation of wait and set instructions”)

Chang, Shpeisman, and Midkiff, taken alone or in any combination, do not disclose or render obvious, at least one of: (1) associating blocks of instructions between start and end of a critical section with color information, the blocks corresponding to a program trace and containing a wait instruction associated with a memory access; and (2) sinking the wait instruction down the blocks globally across the blocks to the end of the critical section using the color information and a dependence constraint on the wait instruction.

First, Chang merely discloses a large superblock from each trace of basic blocks formed by code duplication (Chang, page 268, section 2.4 “Code Scheduling Algorithm”), not a critical section. A superblock is merely formed by duplicating code from the traces of the basic blocks. In contrast, a critical section is a section that is protected to ensure mutual exclusiveness.

Second, Chang merely discloses moving code downward across branch operations within a superblock (Chang, page 268, section 2.5 “Code Scheduling Models”, first paragraph), not sinking the wait instruction down the blocks globally to the end of the critical section. Even if the superblock is a critical section, moving the code downward across branch operations within a superblock does not sink the wait instruction down the blocks globally, or across the blocks, to the end of the critical section. Chang merely discloses moving an instruction downward within a superblock, not globally (or across the blocks), and not to the end of the critical section. To clarify this aspect of the invention, claims 1, 8, 15, and 22 have been amended.

Third, Shpeisman merely discloses a colored conflict graph 700 (Shpeisman, paragraph [0034], lines 1-7), not associating blocks of instructions with color information. Shpeisman explicitly discloses that the color corresponds to a hardware resource (Shpeisman, paragraph [0058], lines 1-3), and the assignment of a color to a node represents the assignment of a hardware resource to the data represented by the node (Shpeisman, paragraph [0058], lines 5-8). In contrast, the rejected claims recite “associating blocks of instructions . . . with color information,” indicating that the colors correspond to the blocks of instructions, not hardware resources such as a data bank (Shpeisman, paragraph [0058], lines 1-3).

Fourth, Midkiff merely discloses a wait instruction to wait until an event occurs (Midkiff, page 1487, right column, Section IV.C “Two synchronization Instruction Sets”), not a wait instruction associated with a memory access. Midkiff explicitly discloses that the wait instruction must be used in conjunction with the set instruction which signals that the event

waited for by the wait instruction has occurred (Midkiff, page 1487, right column, Section IV.C “Two synchronization Instruction Sets”). Accordingly, the wait instruction as taught by Midkiff is not associated with a memory access. To clarify this aspect of the invention, claims 1, 8, 15, and 22 have been amended.

The Examiner failed to establish a prima facie case of obviousness and failed to show there is teaching, suggestion, or motivation to combine the references. When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). “When determining the patentability of a claimed invention which combined two known elements, ‘the question is whether there is something in the prior art as a whole suggest the desirability, and thus the obviousness, of making the combination.’” *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992), 24 USPQ2d 1040; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ (BNA) 481, 488 (Fed. Cir. 1984). To defeat patentability based on obviousness, the suggestion to make the new product having the claimed characteristics must come from the prior art, not from the hindsight knowledge of the invention. *Interconnect Planning Corp. v. Feil*, 744 F.2d 1132, 1143, 227 USPQ (BNA) 543, 551 (Fed. Cir. 1985). To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. In other words, the Examiner must show reasons that a skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the prior elements from the cited prior references for combination in the manner claimed. *In re Rouffet*, 149 F.3d 1350 (Fed. Cir. 1996), 47 USPQ 2d (BNA) 1453. “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the

references." *Ex parte Clapp*, 227 USPQ 972, 973. (Bd.Pat.App.&Inter. 1985). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." *In re Mills*, 916 F.2d at 682, 16 USPQ2d at 1432; *In re Fritch*, 972 F.2d 1260 (Fed. Cir. 1992), 23 USPQ2d 1780.

Moreover, the Examiner failed to establish the factual inquires in the three-pronged test as required by the *Graham* factual inquires. There are significant differences between the cited references and the claimed invention as discussed above. Furthermore, the Examiner has not made an explicit analysis on the apparent reason to combine the known elements in the fashion in the claimed invention. Accordingly, there is no apparent reason to combine the teachings of Chang, Shpeisman, and Midkiff in any combination.

In the present invention, the cited references do not expressly or implicitly disclose any of the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Chang, Shpeisman, and Midkiff is an obvious application of latency hiding of traces using block coloring or an explicit analysis on the apparent reason to combine Chang, Shpeisman, and Midkiff in the manner as claimed.

Therefore, Applicant believes that independent claims 1, 8, 15, and 22 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicant respectfully requests the rejection under 35 U.S.C. §103(a) be withdrawn.

Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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